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THE MYCOPHILE

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The Chaga Story

by Ron Spinosa

"He could not imagine any greater joy than to go away into the woods for months on end, to break off this chaga, crumble it, boil it up on a campfire, drink it and get well like an animal. To walk through the forest for months, to know no other care than to get better! Just as a dog goes to search for some mysterious grass that will save him . . ." From *The Cancer Ward* by Aleksandr Solzhenitsyn

Very few westerners had heard of chaga before Solzhenitsyn introduced it in his 1968 novel *The Cancer Ward*. The protagonist, Oleg Kostoglotov, is a political prisoner, who has been released from a prison camp only to find that he has developed cancer. He is assigned to a clinic for the treatment available at the time (primarily high-dose radiation), knowing that his prognosis is next to hopeless. In the chapter entitled "The Cancer of the Birch Tree" Oleg tells his fellow cancer sufferers on Ward 13 a tale about "the birch fungus." He has their rapt attention since *"all longed to find some miracle doctor or some medicine that the doctors here didn't know about . . . or a herbalist or some old witch of a woman somewhere, whom you only had to find and get that medicine from to be saved "*(143).

Kostoglotov in fact claimed to know such a doctor, with whom he was in correspondence—Dr. Sergei Maslennikov, an old country doctor from a remote region near Moscow: *"He'd worked dozens of years in the same hospital . . . and he noticed that although more and more was being written about cancer in medical*

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Bob and Ron choppin' chaga

In this issue of *The Mycophile* we have a number of travel-related articles to help transport you from your snow-covered climate to someplace more conducive to the growth of our prized woodland denizens. It's also a good time to get you thinking about this year's upcoming Annual Foray, to be held in beautiful Alberta, Canada. In the issues leading up to the Foray, be sure to watch for articles written by members from our host club!

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PRESIDENT'S MESSAGE

Almost every day I receive an e-mail or two with a question pertaining to mushrooms or fungi in general. Sometimes the questions are beyond my knowledge and must be referred elsewhere. One of the best aspects of this position is that you get to know people who can answer those questions. Other times, the questions are at my level. Without offending anyone, I'd like to share some of these questions with you. I hope you find them interesting.

"I found a white mushroom— is it poisonous?" Where do you start with this one? That's all there was, no description, picture, or anything to give a clue about identification. I'm smart enough to know better than to give advice on edibility via e-mail, especially with no more information than this. To my surprise, most of the identification inquirers have no interest in eating their find; they just want to know what it is because they've never seen anything like it before.

"What happens if a fairy circle dies out? Would the grass/trees/plants inside stay dead or grow back?" That's one potent fairy ring. I'm not sure what species it is that kills everything within its reach, but cattle beware.

"Do you know of a place where I can buy mushroom seeds?" I receive several garden supply catalogs as I do enjoy my vegetable garden. I cannot seeing recall mushroom seeds in there with the tomatoes and okra. However, I could refer this person to several spawn providers.

Perhaps my favorite: "How quickly could someone die if they were to touch a mushroom, on average?" I believe there is a fear of fungi here that

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NAMA'S NEST EGG

NAMA has a Nest Egg, as yet of modest size, but poised to grow. Whether it will become a chicken or a T. Rex depends on the sustenance that you, our members, provide. Our Endowment Fund was created in 1999 by the Board, which also created a Finance Committee. The purpose was to provide a stable source of funding for NAMA's scholarships and other projects. However, no funds were provided, and the Finance Committee was free to find its own ways.

In 2003, Finance Chair Ben Woo proposed a package that rolled the existing Knighton Fund, the Mexico Fund, and the Toxic Poster Fund into a single endowment fund, amounting to about $9,000. He also proposed transferring $5,000 from NAMA's general reserves to the Endowment. To encourage contributions to build the Endowment, he challenged to Board to match his $1,000 donation to the Fund, asking for 100% participation. His motions were approved.

In 2005, the Finance Chair proposed that 10% of NAMA's annual net revenue be transferred to the Endowment Fund, which was approved by the Board. The Fund is now close to $20,000 and is invested in a conservative package of growth and income equities.

From time to time, the Finance Committee has received suggestions that we should be approaching Foundations or major corporations to fund our Endowment. Our best-case statement for such support would be a demonstration of strong participation by our own members in building this Fund. We are a nonprofit organization eligible to receive tax-deductible contributions. We have more than a thousand members. If each member contributes $20 we will double our Endowment. ***You can help build our Nest Egg.***

Moving?

Please send your new address, ***two weeks*** before you move, to

Ann Bornstein
NAMA Membership Secretary
336 Lenox Avenue
Oakland, CA 94610-4675
<Membership@namyco.org>

Otherwise—you may not be getting your newsletter for a while. Each issue, several *Mycophiles* are returned as undeliverable because of no forwarding address on file. NAMA is charged ***seventy cents*** for each returned or forwarded newsletter.

NAMA is a 501(c)(3) charitable organization. Contributions to support the scientific and educational activities of the Association are always welcome and may be deductible as allowed by law. Gifts of any amount may be made for special occasions, such as birthdays, anniversaries, and for memorials.

Special categories include
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9th Annual SOMA Winter Mushroom Camp
January 14–16, 2006

Details are in the Sep./Oct. issue of THE MYCOPHILE. To obtain a registration form or receive more information, check out their website, www.SOMAmushrooms.org, or call Rick Meininger, SOMA Winter Camp Co-Director, at (707) 938-4106.

Camp Mushroom at the Sea Ranch Lodge
January 20–21, 2006
Sea Ranch, California

Learn to hunt, collect, identify, and harvest wild mushrooms along the Sonoma Coast with well-known mushroom experts. This unique and fun weekend starts off Friday, Jan. 20, with a Welcome Reception featuring wild mushroom appetizers and cocktails and a chance to meet wild mushroom experts and other mushroom hunters. On Sat., Jan. 21, guests are welcome to meet for a complimentary breakfast in our main dining room. After breakfast Camp Mushroom participants will meet to start the fun and educational mushroom foray in the forest.

Full transportation is provided as well as a basket of mushroom-hunting goodies and supplies. Following the hunt, participants will enjoy a scrumptious lunch at the park followed by an in-depth mushroom educational seminar conducted by well-known mushroom expert Charmoon Richardson. In the evening hunters will enjoy a four-course dinner filled with culinary delights featuring wild mushrooms and local Sonoma County wines. Another highlight of the evening will be mushroom contests and prizes along with ongoing educational discussions.

Camp Mushroom is a great way to truly learn and experience wild-mushroom hunting along the Sonoma Coast. Makes a great gift! Special packages are available that include luxurious ocean view accommodations at the renowned Sea Ranch Lodge.

For more information, see the website www.searanchlodge.com. For reservations and more details contact Cyndi at the Sea Ranch Lodge, (707) 785-2317 ext. 101.

First Annual Oregon Truffle Festival
January 27–29, 2006

The festival is co-sponsored by the North American Truffle Society. For more information see the Nov./Dec. issue of THE MYCOPHILE, call or e-mail Steven Remington at (541) 517-6707 / <steve@oregontrufflefestival.com>, or visit the website at www.oregontrufflefestival.com.

Joint Annual Meeting: Mycological Society of America / Canadian Phytopathological Society / American Phytopathological Society
Québec City, Québec, Canada
July 29–August 2, 2006

This conference is still in the planning stages.

8th International Mycological Congress (IMC8)
Cairns, Australia
August 21–26, 2006

Details can be found on the website: www.sapmea.asn.au/imc8.

Bavarian Mushroom Foray
Summer 2006

The valleys and mountain hillsides in the Bavaria Alps are a haven for mushrooms. Some fungi are familiar to North Americans; others are less usual. Posh Journeys (Helga VanHorn and Freia Bradford, member of Pikes Peak Mycological society) offer a ten-day mushroom tour in Garmisch-Partenkirchen for late summer. Both Helga and Freia grew up in the Garmisch-Partenkirchen, Bavaria, and have picked mushrooms since childhood. A local guide will be available. Accommodations will be in a comfortable Bavarian inn within walking distance of mushroom-rich hills and forests. Aside from forays with easy to intermediate hikes, there will be sightseeing within Bavaria and neighboring Austria. Exact dates, cost, and specifics for the tour—which will be all inclusive for accommodation, transportation, sightseeing, and meals—will be available in February and may be viewed on Posh Journeys website. For additional information or brochure contact Freia Bradford at (719) 784-3838, e-mail <freia@redgeckointernet.net> or Helga at (775) 852-5105, or e-mail <contact@poshjourneys.com>. Since this is a very unusual and personal trip, the number is limited to a small group.

Foray Newfoundland & Labrador 2006
Avalon Peninsula, Newfoundland
September 15–17, 2006

Foray still in the planning stages; details will be forthcoming.

Thailand Mushroom Ecotour

Are you interested in looking for mushrooms in northern Thailand? We are currently trying to organize a mushroom-oriented "ecotour" in northern Thailand, outside of Chiang Mai. The tour will include a variety of things to be determined by participants later, but will revolve around collecting in the mountainous areas near Chiang Mai. Lectures, cultivation workshops,

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Fungal spores with more power than a Space Shuttle launch? From the latest issue (July–Aug '05) of the Mycological Society of America's journal *Mycologia* comes an article (97[4]: 866–71) by a number of researchers, including Anne Pringle of Harvard and Nik Money, documenting the launch of fungal ballistospores. How are spores shed from most species of fungi? Glad you asked! The authors not only explain how, but if you go to the *Mycologia* website (either bring your password or someone who's got one), they'll show you how with a short video. Very cool! Simply click on the table of contents for the current issue of the journal, then click on the title of the article. But I digress . . . Ballistospore discharge is a feature of 30,000 species of mushrooms, basidiomycete yeasts and pathogenic rusts and smuts. The biomechanics of discharge may involve an abrupt change in the center of mass associated with the coalescence of Buller's drop and the spore. However, this process occurs so rapidly that the launch of the ballistospore has never been visualized. The authors used ultra high-speed video recordings of the earliest events of spore dispersal using the yeast *Itersonilia perplexans* and the distantly related jelly fungus *Auricularia auricula* (the tasty wood ear fungus—think Chinese hot-and-sour soup, here). Images taken at camera speeds of up to 100,000 frames per second (!) demonstrate that ballistospore discharge does involve the coalescence of Buller's drop and the spore. Recordings of *I. perplexans* demonstrate that although coalescence may result from the directed collapse of Buller's drop onto the spore, it also may involve the movement of the spore toward the drop. The release of surface tension at coalescence provides the energy and directional momentum to propel the drop and spore away from the fungus. Analyses show that ballistospores launch into the air at initial accelerations in excess of 10,000 G (that's more than a Space Shuttle launch!). There is no known analog of this micromechanical process in animals, plants or bacteria, but the recent development of a surface tension motor may mimic the fungal biology described here. For more on spore discharge, the famous A. H. R. Buller, and the research by the latter of the former, check out Nik Money's article in *Mycologia* (1998; 90: 547) entitled "More G's than the Space Shuttle: ballistospore discharge" or read his fascinating book, *Mr. Bloomfield's Orchard*.

Sooner or later, your child is bound to ask, "Where DO morels come from?" From the British Mycological Society's journal *Mycological Research* (109[4]: 508–12) comes a paper entitled "External ultrastructure of fruit body initiation in *Morchella*" by Segula Masaphy of Israel. The external morphological changes occurring during initiation and early stages of fruit body development of a *Morchella* sp., before the development of asci, were examined by scanning electron microscopy. According to the author, four stages of primordial development were distinguished. First, disk-shaped knots of 0.5–1.5 mm were observed on the surface of the substrate. Next, the knot inflated and a primordial stem emerged from its center. Afterward, the stem lengthened, oriented upward, and two types of hyphal elements developed: long, straight and smooth basal hairy hyphae and short stem hyphae, some of which were inflated and projected out of a cohesive layer of tightly packed hyphal elements. Finally, when the stem was 2–3 mm long, pre-apothecia emerged in the apical end, with ridges and pits having distinguished types of paraphyses. Extracelluar mucilage covered the ridge layer and helped give the tissue its shape and rigidity. If you have access to a copy of the journal, the electron micrographs are beautiful and show exquisite detail of a developing morel fruitbody (well, the primordia, anyway). This paper is of interest to anyone interested in morel development; the Literature Cited, alone, would make it worthwhile to track down a copy.

They grow up so quickly! Also from *Mycological Research* (109[5]: 627–34), Money and Ravishankar elucidate the "Biomechanics of stipe elongation" of mushrooms. We all know that mushrooms have the amazing ability to emerge very quickly—often overnight. (Too often, the choice edibles seem to never emerge!) And we've all seen the amazing ability of developing mushrooms to move overlying obstructions, including hard-packed soil and even pavement! (Several issues back, THE MYCOPHILE featured a Mushroom of the Month photo of a mushroom breaking through pavement.) How is this possible? It's all about hydrostatic pressure, or turgor, folks. Money and Ravishankar set out to reexamine the classic studies of Buller on stipe elongation, aided with vastly superior modern equipment in the lab. Stipe elongation in fruit bodies of *Coprinopsis cinerea* (syn. *Coprinus cinereus*) was examined using two strains: one that produces normal fruit bodies with relatively short stipes, and a mutant that produces abnormally elongated stipes. Measurements of the pressure exerted by developing mushrooms were made using strain gauges, and these data were compared with measurements of the pressures exerted by vegetative hyphae of the same strains. The experiments demonstrate that hyphae elongating within stipe tissue push with the same pressure (approx. 0.5 atmosphere) as vegetative hyphae growing through their food sources (and the authors found both strains pushed with equivalent force). In purely biomechanical terms,

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Mushroom
The Journal of Wild Mushrooming

Other magazines urge you to subscribe, but ***we invite you to join friends on what we call "printed forays"!***

For 20 years, *Mushroom the Journal* has provided information of value to those who like to hunt, name, cook, study and photograph wild mushrooms. We've answered —

- How do professionals find "pillowcasefuls" of morels?
- In the future, will you have to pay to pick on public land and still have to contend with bag limits?
- If you discover a new species, can you name it anything you want?
- Should you worry about violence from commercial pickers?
- Can you do more with choice edibles than toss them in a sauté pan with butter?
- Can you grow your own truffles? Train your own truffle hound?
- Can you subscribe to the ***world's best mushroom magazine*** and have your satisfaction guaranteed? (You certainly can guess that answer—and yes, you can also train the dog.)

We're proud of the job we do of reviewing books of interest to the amateur mycologist. Before you buy, you'll know whether you should. Think we're kidding about "joining" rather than "subscribing"? Our Letters column lets you speak out, or contact others to seek that special book or sell that historic mushroom basket.

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P.S. How did you hear about Mushroom the Journal?

Fungi in the News, continued from page 4

the fruit body may therefore be viewed as a relatively uncomplicated sum of its parts, as the cells there seem to operate much the same as the cells of growing, albeit vegetative, hyphae.

◆

And speaking of *Coprinus*, the Sept./Oct. issue of *Audubon* magazine had a brief story on the deliquescing properties of the popular edible mushroom known as the shaggy mane. According to the author, other mushrooms broadcast spores through their gills, but the shaggy mane releases most of its spores by secreting self-digesting enzymes that, within hours, turn the cap into a puddle of black goo, "as if it were a witch doused by Dorothy." Furthermore, "in George Washington's day this goo was used for ink." (For details on how deliquescence assists in spore ejection from the closely spaced gills, see Tom Volk's mushroom website.) At the end of the *Audubon* article advice is given on how to utilize these tasty if ephemeral mushrooms before they turn into said goo. Basically, do it quickly!

Extreme sex! (Warning: this story contains mature content and may not be suitable for the mycologically challenged!) Turning to the pages of the British *Mycologist* an article (19[2]: 51–58) entitled "Sex in the extremes: lichen-forming fungi" caught my eye. Seymour, et al., describe how lichens are characteristically found in environments subject to extremes of temperature, desiccation, and low nutrient status. Despite this, sexual reproductive structures are often formed in abundance. The underlying mechanisms of reproduction in lichen-forming fungi are discussed, together with possible ecological reasons for the persistence of sexuality. Special features of lichen sex are highlighted including sex at the limits of life on earth in Antarctica, re-lichenization following sex and dispersal, and the perennial nature of lichen fruiting bodies.

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Also from *Mycologist,* you will want to check out "High-elevation gray morels and other *Morchella* species harvested as non-timber forest products in Idaho and Montana" by Erika McFarlane, David Pilz, and Nancy Smith Weber (19[2]: 62–68). The researchers investigated post-fire morels (*Morchella* species), especially the gray morels of Idaho and Montana, by collecting ecological and genetic data and by interviewing commercial mushroom harvesters and buyers. Gray morels fruited exclusively in high-elevation *Picea/Abies* forests that had burned the preceding summer, predominantly in zones of moderate fire intensity, as indicated by a layer of dead conifer needles on top of the fire ash.

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Fungi in the News, continued from page 5

Genetic analysis revealed five varieties of morels among the specimens. Mushroom harvesters confirmed that gray morels are economically crucial to their business because they are typically large, heavy, and durable. Harvesters and buyers described the varieties of morels they encountered differently from how mycologists did, but cooperative research could facilitate mutual understanding of morel diversity and benefit everyone involved. The connection between fire and some species of morels is also discussed.

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The current issue of *Mycologist* (19[3]) is a special issue devoted to "The Mycorrhizal Symbiosis." Those wishing to be initiated into this hot area of research should be sure to track down this issue. Here is a sampling of the many interesting articles: "Mycorrhizal symbiosis: myths, misconceptions, new perspectives and further research priorities," "The ecology and evolution of the arbuscular mycorrhizal fungi," "The ectomycorrhizal symbiosis: life in the real world," and "Plants parasitic on fungi: unearthing the fungi in myco-heterotrophs and debunking the 'saprophytic' plant myth." Good stuff.

More Good Stuff . . . A grilled portobello is its own reward, but there's more to *mushrooms* than great flavor. They're fiber-rich, low in fat and calories, and heart-healthy, too, reports Alexandro Zissu in the Oct. '05 issue of *Health* magazine. A University of Illinois at Urbana–Champaign study found that six mushroom varieties—raw and cooked white button, crimini, portobello, maitake, shiitake, and enoki—are rich in chitin, a compound that may help lower cholesterol and is most concentrated in raw mushrooms.

According to recent research, described in the Oct. '05 issue of *Natural Health* magazine, mushrooms may be champion disease fighters, helping to prevent cancer and heart disease. Not only do they taste earthy and delicious, they can aid weight-loss efforts. Fresh and dried mushrooms are rich in many of the nutrients the body needs to operate properly. They are also the best land-based source of vitamin D, claim Darryn Eller and Julie Toy, the authors of the *Natural Health* article. Furthermore, many edible mushrooms contain compounds called polysaccharides that bolster the immune systems of humans that consume them. Tom Weede, in a separate article of the same issue of *Natural Health,* states that specialists recommend oral formulas that combine astragalus with reishi and maitake mushrooms to prevent warts, likely through the action of bolstering the immune system. And reports from Japan suggest that shiitakes may play a role in lowering blood cholesterol.

We mycophiles usually have no problem consuming enough mushrooms. The challenge often is to find new and creative ways to use the bounty of the woods. Try these tasty ways to add mushrooms to your diet.

- The best way to capture their depth of flavor is to oven-roast them on a cookie sheet or sauté them in a pan large enough to caramelize them, says Eve Felder, associate dean for culinary studies at the Culinary Institute of America.
- Sauté creminis (baby portobellos) and toss with whole-wheat pasta and just-wilted arugula. The bitterness of the greens plays up to the mushrooms' earthiness.
- Felder grinds dried porcinis and uses the powder to dust steak and firm-fleshed fish like halibut or bass. She then pan-sears the fish in oil or roasts it in the oven with shallots and white wine; the steaks are great grilled or sautéed. If you want to save time, use a mushroom seasoning blend like FungusAmongUs ($5.19, available nationwide).

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In a recent issue of *Nature* (437[7063]: 1248), Tim Lincoln presents a study that determines the incidence of "poisonousness" in mushrooms using modern evolutionary trees. The researcher gives descriptions of toxins as a metabolic by-product and makes comparisons of related poisonous and edible forms. I found this to be a fascinating investigation which has led the author to make the hypothesis that poisonous *mushrooms* use odor as warning signals.

Attention Mycotechies! For those already spending way too much time on the internet, here are two mycophilic sites to check out:

Cortbase can be found at andromeda.botany.gu.se/cortbase.html and deals with those pesky corticioid fungi. The taxonomy of these mushroom cousins gives most of us fits. Over the years more than 8,000 names have been given to what many consider to be about 2,000 species. This site, set up by mycologists at Tartu University in Estonia and Göteborg University in Sweden, helps guide mycophiles through the baffling nomenclature, identifying which species names are still in use and offering help in identification.

The Ohio Mushroom Society recently has developed a compilation of all the species lists from their forays, going back to 1974. This is a tremendous body of work and is valuable information to the amateur and professional mycological communities. These data, along with a number of online identification keys can be found at their website: go to www.ohiomushroom.org/index.html, then click on the "Mushroom Links" and select "Shirley Hyatt & Terry Miller's Homepage." Of course, there are numerous other excellent mushroomy links to click as well.

Reflections on Preserving Mushrooms via Canning or Pickling, by Michael W. Beug, Ph.D., Chair, NAMA Toxicology Committee

Recently a friend of mine contacted me about a mushroom pickle recipe that appeared in the Oregon Mycological Society (OMS) Newsletter. She was concerned that there was not enough vinegar involved to safely preserve the mushrooms. While I thought the amount of vinegar was adequate, my wife Ann commented that the OMS recipe did not have enough salt. These questions prompted me first to do a little research and some mathematics and then to uncover some fascinating history. Let me unfold the story for you.

A fundamental concern with canning any low-acid foods (and that includes mushrooms) is the potential growth of unwanted molds that can produce mycotoxins, contamination by species of *Salmonella,* and contamination by various species of bacteria, especially the *Clostridium* species, which include the bacterium *Clostridium botulinum.* Dormant spores are everywhere, covering all foods we eat. Focusing for a moment on *Clostridium botulinum,* if we eat fresh foods, there is no problem because the spores germinate only in the absence of air. Canned foods have no air and thus provide a suitable medium for growth of the bacterium and production of the toxin. Two billionths of a gram of Botulinum toxin can cause symptoms. Sticking your finger into a suspect can and then licking it can be enough to kill you if, in processing the canned goods, you did not either kill all of the *Clostridium botulinum* spores or prevent their growth by keeping the canned goods sufficiently acid. The spores can be killed by heating at 240° F for up to 2 hours (a process which requires a pressure canner). However, the USDA and other official sources say to avoid canning wild mushrooms because processing times have not been worked out for any of the wild species. Processing times are affected by the texture of the food, the size of the pieces, the size of the container, and the altitude. Processing pressures required are affected by altitude.

Though the spores are not killed, keeping the pH less than 4.6 can prevent the growth of *Clostridium botulinum* spores and the spores of other *Clostridium* species. This can be accomplished by several different methods but the most common is use of vinegar. Thus pickling and then canning in a hot water bath is a way that wild mushrooms can be stored. Standard vinegar (5%) has a pH of 2.4, and diluting it 50% with water (as is called for in most pickle recipes) increases the pH only to 2.6. Adding the mushrooms with their water would bring the pH to about 3.1, clearly acid enough to keep the *C. botulinum* spores from germinating. However, mushrooms and other foods are also contaminated by yeasts, molds, and other bacteria. The yeasts and the molds can tolerate very acidic pH, and some can metabolize vinegar. In time, this could cause the pH to rise above 4.6 and produce Botulinum toxin (to say nothing of other toxins and/or off-flavors) even in pickles. Thus a combination of tools is needed to preserve food of any kind. The OMS recipe called for processing in a hot water bath where the heat (at least 175° F) would kill most common yeasts, molds and bacteria. It also called for some salt, but only about one-fifth as much salt as is called for in any of my pickle recipes. I knew of the use of salt as a preservative (via its ability to desiccate cells) and wondered if that was its role in this recipe. Seeking the answer led me first to read up on salt and then to learn more about pickle making.

Salt, an essential dietary item, was once so hard to come by that civilizations rose and fell on the salt trade. Some native peoples traded gold for salt pound for pound. Salt has been used as a symbol of divinity, purity, welcome, hospitality, wit, and wisdom. The word "salary" derives from "salt," and many phrases like "worth his salt" grace our language. Salt is used for flavoring, pickling, preserving, canning, curing meat and fish, and tanning. I wanted to explore the role of salt in pickling.

Pickle-making has a history that goes back several thousand years. The English word pickle is said to derive from one of two roots: 1) the Middle English pikel, "a spicy sauce or gravy," or 2) the Dutch phrase "in de pekel zitten"—literally, to sit in the salty solution used for preserving meats and vegetables.

I soon discovered that there are two different routes to pickling: using vinegar, and fermentation. The fermentation that I was familiar with, the use of the *Saccharomyces* family of yeasts, converts carbohydrates to alcohols and carbon dioxide. The fermentation in pickle-making utilizes bacteria of the *Lactobacilliaceae* family to produce enzymes that oxidize alcohols to lactic and acetic acid. The bacteria are stimulated by the addition of salt. The salt thus serves two roles in a pickle recipe—it draws water from the mushrooms or other foods by osmosis, and it triggers fermentation. The fermentation in turn produces acids that help preserve the food. Fermentation also generates complex flavors and releases vitamins.

Now I had my answer about salt in the pickle recipes in my recipe books versus the OMS recipe. In the OMS recipe the salt is there as flavoring. In my recipes for pickles the salt was there also as a fermentation aid. This suddenly explained to me why our cucumber pickles were so much tastier a year or more after canning than a month or so after canning—the pickles had been slowly fermenting. Would controlled fermen-

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A Long Island Fungus-Farming Ant

by Joel Horman

Most of us are aware of the leaf-cutting tropical ants that have been cultivating fungus gardens for more than 50 million years and are confined to the Americas. We have mentioned recent discoveries regarding their farming practices in the "Gleanings" column [of the Long Island club's newsletter, *Sporeprint*], and natural history programs on television have publicized their columns of tireless workers holding aloft their tiny green prizes (above their heads like umbrellas, which is why they are sometimes called "parasol ants"). But not all fungus ants are leaf cutters, and some species collect insect parts, caterpillar droppings, and other frass to provide a substrate for their gardens. One such, I was surprised to learn, colonizes the southern United States and reaches, in its northernmost extension, to the pine barrens of Long Island.

Trachymyrmex septentrionalis, commonly known as the "southern fungus farming ant," lives in small, inconspicuous colonies of 500–1500 individuals. They are found in the Pine Barrens, where their nest entrance is usually hidden in sandy soil among fallen pine needles but may be discovered by noting the excavation mound nearby, which takes a semi-circular or lunate pattern. The average nest depth is 3 feet or less and consists of 2 egg-shaped chambers where the fungus is grown and their eggs hatch. Larva feed exclusively on the fungus—or to be exact, upon specialized fungal cell protuberances called gongylydia, which are nutritive bodies produced only in ant colonies, and which perhaps represent the fungus's "remuneration" of their caregivers, somewhat in the fashion that, e.g., corn under cultivation produces larger and more nutritive kernels than the ancestral wild variety. In other words, biologists raise the question, "Is the ant domesticating the fungus, or the fungus domesticating the ant?" This is not so far-fetched as it may sound when we consider such evolutionary developments as the aromas produced by truffles to entice their mammalian disseminators.

Human agriculture, though hardly so ancient, is speculated to have arisen in parallel ways—that is, by foragers accidentally dropping fragments (seeds or spores) in the vicinity of the dwellings, leading to some sort of continued interaction and feedback between the two organisms. In one case this has led to a long history of coevolution, and in the other to directed breeding; although as Darwin remarked, "the art has been simple and followed almost unconsciously."

While tropical fungus ants can be active all year around, their northerly representatives are faced with the onslaught of freezing winter temperatures, when no fungus can grow. At this time, they are forced to hibernate and will not become active again until temperatures rise high enough in the Spring to activate their fungus garden. The fungus also remains in an inactive form during this time, but its exact nature is not known.

Although *T. septentrionalis* do not normally cut leaves, there is documentation of their occasionally doing so in early Spring, when their usual insect material is not available. The higher attine ants, of which *T. septentrionalis* is one, will also gather wild fungi from the field if for some reason they lose their traditional source. (*Trachymyrmex* queens normally transfer a bit of the fungus to a new colony by means of a specialized pouch in their cheek. On L.I. the mating flight takes place in early August.) However, they confine themselves to species very closely related to the original, normally a member of the *Leucocoprineae* (*Leucocoprinus, Leucoagaricus,* and *Lepiota*) and, in experiments, refuse all others. Persistent cropping by the ants prevents the development of any fruiting bodies, although abandonment of the nest may permit such fruiting, as also occurs in African termite colonies, where giant *Termitomyces titanicus,* much sought after by foraging humans, can reach 3 feet in diameter. However, some farmed species are so highly domesticated that they occur in ant nests only in a yeast-like form and never form fruiting bodies. While the continental separation of *Termitomyces* was long believed to be absolute, Dr. Roy Watling, in his presentation at NEMF 2005, revealed the startling news that it has recently been identified in tropical America, although its symbiotic helpmate remains unknown.

Other genera of the tropical Attine ants cultivate the pterulaceous or coral fungi, and the more primitive of these weave the hyphae into a veil that covers the colony like a tent, rather than having an underground nest.

Southern Louisiana, Texas, and Arizona are host to several species of leaf-cutting ants belonging to the genus *Atta* and *Acromyrmex,* which are at the northernmost limit of their range. Europe, on the other hand, has no fungus farming ants, but the European forest ant, *Lasius fuliginosus,* uses an ascomycete fungus, *Cladosporium myrmecophilum,* for structural purposes, reinforcing its sponge-like nest with the fungal mycelium. *Cladosporium* usually infests decaying plant material, but this particular species is found nowhere but the nest of *L. fuliginosus,* in a mutualistic symbiosis.

Like human farmers, the fungus ants are cultivating a monoculture, and even after 50 million years, they are only one step ahead of invasive pests and parasites.

[*The author is a member of the Long Island Mycological Club. This article originally appeared in the Long Island club's newsletter,* Sporeprint, *and is reprinted here with permission. For additional reading on this fascinating symbiosis, check out the article on this subject in the Jan. 1956 issue of the journal* Ecology *(37[1]: 150–61).*]

It's Not Easy Being Stinky

And plants, at whose names the verse feels loath,
Filled the place with a monstrous undergrowth,
Prickly and pulpous, and blistering, and blue
Livid, and started with a lurid dew.

And agarics and fungi, with mildew and mould
Started like mist from the wet ground cold;
Pale, fleshy, as if the decaying dead
With a spirit of growth had been animated!

Their moss rotted off them, flake by flake
Till the thick stalk stuck like a murderer's stake
Where rags of loose flesh yet tremble on high,
Infecting the winds that wander by . . .

—Percy Bysshe Shelley (1792–1822)
from "The Sensitive Plant" (1820)

hat smells a foul-flesh'd agaric in the holt,
And deems it carrion of some woodland thing,
Or shrew, or weasel, nipt her slender nose
With petulant thumb and finger, shrilling . . .

—Lord Alfred Tennyson (1809–92)
from "Gareth and Lynette" (1859)

Ants feeding on the gleba of a fallen stinkhorn. Photo submitted by Tamara Spillis of the Ohio Mushroom Society

STEVE NELSEN IN JAPAN

I: Shoichi Yoshimi and Nature Studies in the Kyoto Gyoen

I visited Japan for two months (actually 60 days; they are very specific and check your tickets before you get your money) in February–March 1996 on a Japan Society for the Promotion of Science fellowship. These trips are funded by the Japanese government and, as far as I can discern, were set up by the U.S. Occupation government; but they are still maintained today, which I appreciate greatly! I visited and lectured at 22 universities and research facilities on this trip.

In Kyoto my good friend Ken'ichi Takeuchi, who knows about my peculiar interest in fungi, introduced me to Shoichi Yoshimi, who is the most accomplished amateur mycologist I have ever met. Yoshimi was at that time a 69-year-old retired elementary school teacher and principal who built his private school into one of the most prestigious in Kyoto. He told me that, forty years before, one of his students brought him a mushroom, and he was embarrassed when he knew nothing about it. He went to the library and looked up what it was, got interested, and eventually was trapped into studying fungi. He had two popular books with color pictures in print when I visited, and has published scientific papers including "Gasteroid Fungi of Pakistan" in English in *Cryptogamic Flora of Pakistan*, published by the National Science Museum, Tokyo. He is also especially enthusiastic about the genus *Cordyceps*, which abounds in the moist climate of Japan. Yoshimi was the Kyoto mushroom expert for the Association for Preservation of National Gardens. He and I gave competitive mushroom slide shows to Takeuchi's somewhat bewildered Chemistry graduate students.

Later, I was lucky enough to be taken by Ken and Hisako Takeuchi to the March 3, 1996, nature study session in the Kyoto Imperial Garden (Kyoto Gyoen), which is the grounds surrounding the former Imperial Palace in the middle of Kyoto, about 1.25 by 0.7 km in size. One can tour the buildings with guides during the year, but the nature study tours, which are free (and not for tourists, as they are given in Japanese), occur only four times a year. The one I attended had lectures by the APNG experts on birds, trees, herbs, insects, and mushrooms. Handouts were provided, showing some key information. For the fungi, Yoshimi showed ascomycetes, including drawings of morels, *Verpa conica,* two *Helvella,* a *Peziza,* and an *Otidea,* as well as microscopic features for two of them. For the birds, everyone got photographs and full-page descriptions of a thrush, a warbler, a bunting, two finches, and a grossbeak which were expected to be migrating through Kyoto on this date. About 100 people showed up and dutifully followed each expert around, listening carefully to two and a half hours of lectures delivered outdoors, through megaphones, illustrated with large flip-chart posters. Americans would have wandered off by themselves in twenty minutes (and of course this one, who couldn't understand a word of the explanations, did). Unfortunately the spring of 1996 was dreadfully cold, and the birds were the latest they had been in years; none of the expected species was yet present. The ascomycetes that were expected also had not started yet, but Yoshimi and his assistant produced fresh specimens of *Xeromphalina, Strobilurus, Xylaria,* and a *Cordyceps* in addition to last year's shelf fungi.

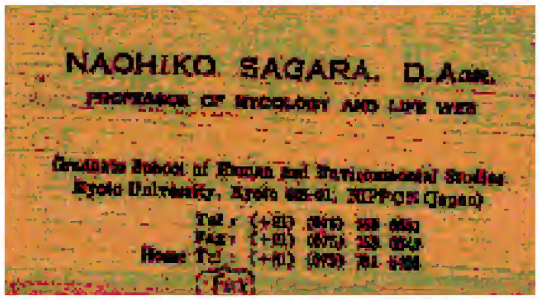
The APNG has had Yoshimi maintaining a collection of fungi and species list for the Kyoto Gyoen since 1985. He was up to 381 taxa of macrofungi in this park in the middle of a city of 1.5 million people! The APNG is not casual about surveying all species of plants and animals that occur in Kyoto Gyoen. Yoshimi and his assistant made 98 official collecting trips for fungi between May 1985 and December 1989 in preparing the initial list of 341 species, published in 1990 in a 98-page pamphlet that also included the flora and the snails of Kyoto Gyoen. Supplements on the fungi were published in 1992 and 1995 showing the more unusual species (including all 40 taxa first observed after 1989), illustrated with detailed drawings of microscopic features as well color or black-and-white photographs. Many of the species are the same in Japan and the U.S.

Morels are unusual enough in Kyoto that each year's collection is documented. *Morchella conica* was present between Feb. 27 and March 26, 1994, and had been seen previously. I would have called it a young *M. esculenta*, but the spores shown are smooth, and Yoshimi shows two pages of drawings of microscopic features for each species (from which I would be unable to distinguish the two). *Morchella esculenta* is apparently rare in Kyoto. It even lacks a Japanese name (*M. conica* is Togariamigasa-take, which seems to be a mouthful). It was first collected on April 20, 1990 (the fifth year Yoshimi officially collected), and had smooth spores, but the next collection, April 24, 1994, showed apiculi developing on the mature spores. The thing I found most interesting is that Yoshimi says that morels are not eaten in Japan because they are considered not to taste good by Japanese.

When I left Kyoto I was presented with three boxed specimens of *Cordyceps*, as well as 22 specimens of the rather rare cage fungus *Lindaria bicolumnata* (Lloyd) Cunningham, collected in a Tokyo park, and sent to Yoshimi for identification (Yoshimi had also found it in the Kyoto Gyoen). For a review see "Cage Fungi" in *Mycologist* (1994, 8[2]: 54).

Continued on page 12

[*Steve Nelson is a member of the Wisconsin Mycological Society. Parts of this article previously appeared in the* Wisconsin Mycological Society Newsletter *and are used here with permission. The impetus for this articles came from one of Stever's presentations that I attended. Upon seeing a vast assortment of mushroom slides, I asked him if he would be willing to put together an article of some of his travels to Japan, and he kindly agreed. The two parts published here are but a brief glimpse at some of his experiences there. —Ed.*]



II: Hebeloma radiculosum *and moles*

I met Prof. Naohiko Sagara, who has "Professor of Mycology and Life Web" on his business card, at Kyoto University (introduced, as usual, by my Chemistry colleague, Ken'ichi Takeuchi). His specialty is study of "fungi that sporulate or fruit restrictedly in forest sites where decomposition of urine, fæces, or dead bodies (cadavers) has occurred." He lists *Rhopalomyces, Amblyosporium, Ascobolus, Tephrocybe, Peziza, Coprinus, Crucispora,* and *Humaria* species which appear early in the succession, and *Hebeloma vinosophyllum, H. spoliatum, H. radiculosum* and an undescribed species; *Lactarius chrysorrheus; Laccaria bicolor, L. amethystina,* and an undescribed species; *Lepista nuda*, *Suillus luteus,* and *S. bovinus*, and a *Mitrula* spp. as appearing late in the cycle. He has shown that regular successions (covering at least three years) can also be stimulated by burying urea, aqueous ammonia solution, or other compounds that decompose to ammonia in the woods. Looking at such successions would seem to be an interesting thing to try in the U.S., too. This work is described in *Can. J. Bot.* 73 (Suppl. 1) S1423–33 (1995). Sagara has discovered that *Hebeloma radiculosum* (when identified correctly) apparently only grows near Kyoto on the latrine areas of mole dens. When you find the mushroom, you have found a mole den and can dig down and find the moles (or at least where they were; Sagara said it takes him about three days to excavate a mole den). He has also published on the moles, about which little was known because their dens are about a yard underground and several from the entrance, so they are difficult to locate otherwise. He was pleased that I had seen his plea for people to tell him when they find *H. radiculosum,* which was published in *Mycology* magazine in the fall issue of 1995. He had had only one response by February of 1996 but was going off to Sweden that summer (at his own expense) to see how closely related the mole species—whose den he was sure he could locate from the site where the mushroom was found—would be to the one he had been studying in the hills surrounding Kyoto. He showed me over a dozen of the nests he had found this way, stored in filing cabinets near his office.

Prof. Sagara has an exceptionally interesting booklet for school children with lovely drawings and text in English and Japanese emphasizing the ecology of fungi.

Lindaria bicolumnata

From Exploring the Mushroom World, *by S. Takayama and N. Sagara, privately published in 1985. Courtesy of Professor Sagara.*

cooking demonstrations, field identification, and microscope work will also be components of the experience.

The tour will be all-inclusive, including transportation, food, accommodations, use of laboratory equipment and guided collecting trips with a native English speaker. Dr. Edward Grand. Dr. Grand is a recent graduate from the University of Tennessee, where he studied *Lentinus*, *Panus,* and other Basidiomycetes with Dr. Ronald Petersen. The Mushroom Centre houses several students working with Basidiomycetes as well as frequent visiting researchers.

For more information about the Centre or the tour, e-mail Dr. Grand at < edwardgrand@yahoo .com > or visit the website at www.mushroomresearchcentre.net. Please note that biological material cannot be taken outside of Thailand without the permission and/or collaboration of a Thai university or institution.

Mushroom Identification Trilogy

Taylor Lockwood announces the release of his biggest project ever, the Mushroom Identification Trilogy. The DVD set is an entertaining visual guide to mushroom identification and explains all the basics with photos, illustrations, and video footage of real mushrooms. It is approximately one hour long and split into three parts: "Introduction," "Into the Details," and "Into the Woods." There are images of the Trilogy cover, ordering links, and a 60-second QuickTime preview at www .fungiphoto.com/treasurechest/MIT/mit.html. For a review, delve deeper into this issue of The Mycophile.

In Memory of Mycologist Bill Cibula

Dr. William (Bill) Cibula died in Houston last week of a massive heart attack. Services were held in Picayune, MS, on Monday, Dec. 5th. Bill was a long-time active member of NAMA. For those who want to send cards, the Cibulas' home address is 700 Idlewild, Picayune, MS 39466. (*Photo courtesy of Dianna Smith*)

Mushrooms in Mexico

by Ron Meyers

Our 50th wedding anniversary was on June 5, 2005. Rather than have a big party, we elected to take our entire family of eight to Mexico for a vacation. We selected the Hotel Copacabana on the Mayan Peninsula, where we had vacationed before. The hotel is located about 20 miles south of Playa De Carmen and the same distance north of the ruins at Tulum, making it a great central location (which by the way, caught the full force of Hurricane Emily head-on in July.)

The hotel is built in an area where the jungle meets the sandy beach. Each day we had a short walk on stone paved paths through the jungle to reach the pool area. As usual I was keeping my eyes open for mushrooms. I had seen only a few LWMs, possibly small *Marasmius*. But one morning on the way to the pool I spotted what looked like a red child's ball of some kind. On closer examination I found a new hatch of *Clathrus ruber,* the first I had ever seen. This dictated a trip back to my room for my camera, and cramped knees while I took several photos.

[*Ron hails from the Kaw Valley club and is a frequent contributor to the Kansas* Mycolog.]

Photo of the latticed stinkhorn, Clathrus ruber *in Mexico, submitted by Ron Meyer of the Kaw Valley Mycological Society in Kansas.*

Catalog of Educational Programs on Mushrooms and Other Fungi

Enrich your meetings and teaching sessions with NAMA slide and video programs. When ordering, please allow plenty of time for packing and shipping by our volunteer. All programs have written scripts, and most also include a narrative on audio cassette. The cassettes are not cued for automatic advance. *Some programs are now on videotape.*

To order: Write, call, or e-mail Carlene Skeffington, giving your name, street address (no P.O. boxes), date you need the program (allow time for previewing), alternative program choice, and phone number where you can be reached. If you wish a confirmation, please enclose a self-addressed postcard with correct postage.

Cost: These programs are available on loan to NAMA members and NAMA-affiliated clubs at no charge; but due to financial restraints, we are requesting voluntary contributions (suggested amount: $5 to $10 per program) to cover the costs of outgoing postage and upkeep. Checks should be made payable to NAMA and enclosed with the program return.

Non-members pay $20 per program; include with your order form a check made payable to NAMA.

After use, please return programs promptly via first class (i.e., priority) mail, insured for $50 per program. UPS or similar commercial carrier is fine, too, and usually includes up to $100 insurance. Please return the enclosed form or pertinent information so that we can verify your return of borrowed materials.

Address for orders and return shipments:
Carlene Skeffington, 505 West Hollis St., Suite 109 (preferred place of contact), Nashua, NH 03062.
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Home: (603) 654-2125, < skeff@tellink.net >

Programs for Rent

Our programs are copyrighted and are not to be used for commercial purposes.

1. Diversity of the Mushroom World. Steve Trudell. 45 min. 138 slides. This is a beginners' program. Lifestyles of mushrooms, where they live, and what they do, with emphasis on the variety of forms, colors, etc. No audio.

2. The Gilled Fungi: The Friesian Method of Classification. Dr. David Hosford & Kit Scates-Barnhart. 40 min. 79 slides. Explains and illustrates with diagrams the terminology and stature type of the Friesian system. This system has been in use for 150 years. Features identification without using a microscope.

3. Gilled Fungi: The Friesian Genera. Dr. David Hosford & Kit Scates-Barnhart. 60 min. 80 slides. For mushroom identification classes and advanced students. Demonstrates which genera of each spore color occur in each stature type and explains how to tell them apart. Most effective if used after program #2.

Programs 4–11 are a series intended to help the student learn to identify a wide variety of common mushrooms, including edible and poisonous species. Program 4 should be viewed first, but the others can be used in any order.

4. Introduction to the Major Groups of Mushrooms. Dr. Michael Beug. 40 min. 80 slides. A general overview of mushroom identification, with music background. May be substituted for program 1. *This is a new program and not a revision of #4.*

5. Gilled Mushrooms I: White Spored. Dr. Michael Beug. 48 min. 80 slides. VHS video available. Includes Amanita, Lepiota, Hygrophorus, and Russula families.

6. Gilled Mushrooms II: White Spored. Dr. Michael Beug. 43 min. 80 slides. VHS video available. Includes Armillaria, Mycena, Flammulina, Collybia, Marasmius, Clitocybe, Laccaria, Lentinus, Pleurotus, and others.

7. Gilled Mushrooms III: Pink to Brown Spored. Dr. Michael Beug. 42 min. 80 slides. VHS video available. Covers Pluteus, Volvariella, Entoloma, Paxillus, Gymnopilus, Pholiota, Heboloma, Cortinarius and others.

8. Gilled Mushrooms IV: Purple-Brown to Black Spored. Dr. Michael Beug. 36 min. 80 slides. VHS video available. Discusses Agaricus, Stropharia, Psilocybe, Coprinus, Panaeolus, Chroogomphus, and more.

9. Non-Gilled Mushrooms I. Dr. Michael Beug. 42 min. 80 slides. VHS video available. Chanterelles, boletes, hydnums, and polypores.

10. Non-Gilled Mushrooms II. Dr. Michael Beug. 47 min. 80 slides. VHS video available. The clavarias and gasteromycetes including puffballs and bird's nest fungi. Also the Hymenogastrales, the false puffballs.

11. Non-Gilled Mushrooms III. Dr. Michael Beug. 43 min. 80 slides. VHS video available. Ascomycetes and Heterobasidomycetes. Includes morels, false morels, and jelly fungi; also discusses slime molds and other fungi.

12. Amanitas of the Pacific North West. Janet Lindgren. 32 min. 62 slides. An overview of some of the many Amanitas to be found in the Pacific Northwest. Includes a chart of the subgenera and sections of the genus Amanita. Reviewed by Dr. Rodham Tulloss.

13. Microscopy in the Study of Mushroom Spores. Dr. Leo J. Tanghe. 40 min. 79 slides. For general audiences. Clearly explains how to use a microscope and prepare slides for observation. Uses photomicrographs to explain the diversity and characteristics of spores for the accurate identification of mushrooms.

14. The Ultrastructure and Diversity of Mushrooms. Paul Stamets. 40 min. 74 slides. The scanning electron microscope reveals the three dimensional details of mushroom spores and tissues.

15. Photographing Fungi. Two parts. Harley Barnhart. 70 min. 156 slides. ***Part I:*** A basic treatment covering the choice of subjects, equipment and film characteristics, use of natural light, exposure, and composition. Suited for audiences with limited photographic skills. ***Part 2,*** a more advanced treatment encompassing techniques for electronic flash and macrophotography (extreme close-ups).

16. Poisonous and Hallucinogenic Mushrooms (revised). Dr. Michael Beug. ***Part I,*** 35 minutes, 40 slides. ***Part II,*** 30 minutes, 40 slides. May be shown as one long program or two short ones. Includes a 23" x 37" wall chart, "Diagnosis and Treatment of Mushroom Poisoning," by Kit Scates-Barnhart. Suitable for general audiences, students, or physicians. Explains the effects of ingesting toxic mushrooms. Covers toxin groups, their chemical compositions, and symptoms. Toxic species are described. *Available on the Web: http://www.evergreen.edu/user/library/tesce/mushroom/phm.*

17. Mushrooms: Macro to Micro. Kim Emmons & Cara Styles. 50 min. 157 slides. Kim and Cara have created a fascinating mycophotographic journey from natural habitats to the microscopic world of fungi. Covers more than thirty species. A guided trip into the language of microscopy and the inner workings of fungi and slime molds. Appropriate for general audiences and mycology students.

18. Mushrooms for Color. Copyright 1989, David Marks Productions. 28 min. VHS Video. A visual record of mushroom-dyeing. Includes scenes from California and Sweden. Much of the footage is from the Fourth International Fiber and Fungi Symposium and Exhibition, Mendocino CA, 1988. Suggested for use along with program #19.

19. Mushrooms for Paper. Copyright 1993, David Marks Productions. 10 min. VHS Video. A how-to demonstration and a record of the opening night of the Exhibition of Mushrooms for Paper at the Mendocino Art Center in October, 1992. Useful for schools and other groups. Suggested for use in conjunction with program #18.

20. A Guide to In-Camera Editing. Copyright A First Generation Video Production. 20 min. VHS Video. Includes a pamphlet. A quick and easy way to edit as you go when taping speakers and documenting events.

21. Morels, Truffles, and Other Spring Fungi. Dr. Michael Beug. 40 min. 80 slides. VHS video available. Includes morels, false morels, cup fungi, truffles, false truffles, puffballs, earthballs, and gilled and pored mushrooms likely to be found in spring. *Available on the Web: http://www.evergreen.edu/user/library/tesce/mushroom/mtsm/mtsm.htm.*

22. Cooking with Hope. Hope Miller. 58 slides. Audio tape not yet available. While traveling with her world-famous mycologist husband, Dr. Orson K. Miller, Jr., Hope had the time and supplies of mushrooms to experiment and developed many creative recipes and cooking techniques. She shares some of these with you.

23. Mushrooms in Kansas. Ron Meyers. 45 min., 80 slides. Covers some of the surprising diversity of mushrooms found in Kansas, many of which probably also are found in the other states of the Great Plains.

24. Winning Slides from NAMA Photo Contests. This is not a formal program, but we will assist you in obtaining some of our most beautiful slides for a discussion or delightful presentation of your own design. Call for more information.

25. Introduction to Mushrooms. Dr. Michael Beug. 50 min. 80 slides. An introductory program for all audiences that covers the most common edible and poisonous mushrooms as well as the best cultivated mushrooms. The program is intended to guide the viewer to the best edible species and away from the most dangerous species. While the emphasis is on mycophagy, attention is also paid to the role of mushrooms in the environment and in human attitudes. *Available on the Web: http://www.evergreen.edu/user/library/tesce/mushroom/introm.*

26. Introduction to Fall Mushrooms. Dr. Michael Beug. 45 min. 80 slides. Focuses on the common basidiomycetes found during the fall season with comments about habitat and ease of identification. The mushrooms represented are from throughout North America with a slight bias towards the species found in the Pacific Northwest. *Available on the Web: http://www.evergreen.edu/user/library/tesce/mushroom/if.*

NEW Video Programs

Available to members and affiliated clubs for a period of two weeks ***free of charge*** except for return postage.

27. A Walk in the Woods. Dr. Samuel Ristich. A group of mushroomers are led on a walk in the woods with Sam as the leader.

28. After the Ashes Cool: A Look at Post Fire Fungi. Dr. Nancy Smith Weber. A thoroughly researched and informative slide lecture on the fungi that grow in forest burn sites. It was filmed at a meeting of the New Mexico Mycological Society.

29. An Introduction to Mushrooming Basics. Dianna Smith videotaped Don Shernoff and the Connecticut–Westchester Mycological Society on two fall walks as Don covers all the important aspects of mushrooming for beginners. He explains mushrooming in a serious, thoughtful, and intelligent manner and draws your interest as you follow him on the walk. Dianna produces videotapes on nature and gardening topics for a weekly cable TV program in New York. 1 hour. (*Available for purchase—see page 17.*)

NAMA Educational Programs continue on page 16

NAMA Educational Materials, continued from page 15

NAMA Mushroom Teaching Kits

In addition to the NAMA Eastern Mushroom Teaching Kit, we are now offering a second Mushroom Teaching Kit with emphasis on the fungi of the Western section of the United States and Canada. Both of these programs are available for rental through our NAMA Education Section programs for grades K–8 (K–12).

The kits are a teaching tool for teachers, naturalists, and clubs, and for use at mushroom and garden fairs. The contents of the kits are similar, with some geographical variation in the slides, dried fungal material, and spore prints.

These kits provide

- Hands-on classroom aids
- Activity ideas that include artistic, cultural and scientific approaches to fungi
- Basic information necessary to teach grades K–8 about fungi. Basic information is divided into grades K–3 and 4–8. It can be used for a 45–60 minute lesson or over an extended period of time. It can also be adapted for use in grades 9–12.

The kits contain

- Lesson ideas and activities for grades K–12 relating to fungi
- Illustrations of fungi on 4" x 5" poster board
- 9 overhead transparencies illustrating basic mushroom anatomy, the variety of shapes and spore-bearing surfaces of fungi, and fungi ecology
- Laminated spore prints
- Mycological Society of America's "What You Can Do with Mycology" posters on the subject of careers in mycology
- NAMA poster on mushroom poisoning
- 35mm slides of different fungi
- 25 plastic hand lenses
- Dried fungi samples
- Foam blocks and skewers (to mount fresh specimens for drawing in the classroom)
- Large magnifying glass on a stand
- "MykoCD" from MykoWeb
- 2 videos on the growth of slime molds
- Taylor Lockwood's DVD of his "Treasures of the Fungi Kingdom" shows
- Teaching materials developed by Dr. Walter Sundberg
- Wool samples made with fungal dyes and "Fungal Elf," all by Sue Hopkins
- Books: Katya Arnold and Sam Swope, *Katya's Book of Mushrooms*; David Arora and Jeannette Bowers, *Mushrooms of the World Coloring Book*; Emily Johnson, *North American Mushroom Photo Postcards*; Bryce Kendrick, *A Young Person's Guide to the Fungi*; Nancy Parker, *A New Home for 'Lil Gnome*

Kit Rental Information

The rental fee for each program for NAMA members and affiliated clubs is $40; for non-members the fee is $50. The program is the property of the authors and of NAMA and is not to be copied or used for commercial purposes. *We encourage nonmembers to join NAMA in order to rent our programs at the member rates.* The renter will pay return postage and $100 insurance. Send a request to rent the kit for one week to ten days, together with a check or money order made out to NAMA, to

Eastern Mushroom Teaching Kit
Carol Dreiling
61 Ardmion Park
Asheville, NC 28801-4201
caroldrei@aol.com / (828) 254-6199

Western Mushroom Teaching Kit
Catharine Gunderson
1141 E. Cliff Drive,
Santa Cruz, CA 95062
cag@cruzio.com
(831) 425-8900

Acknowledgments: Many thanks to NAMA members who contributed to the contents of the kits: Dean Abel, Carol Dreiling, Louise and Bill Freedman, Catharine Gunderson, Susan Hopkins, Emily Johnson, Taylor Lockwood, Theresa Oursler, Nancy Parker, Samuel Ristich, Maggie Rogers, Sandy Sheine, Allein Stanley, Walt Sundberg, Mike Wood. If you would like to add items to the Mushroom Teaching Kits, please send them to Carol Dreiling or Catharine Gunderson. We would like objects such as dried fungi, spore prints, books, videos, and other teaching materials.

NAMA Mushroom Trunk

We are offering a new program for rent, in the form of a kit for teaching about mushrooms for grades K–8.

The Mushroom Trunk provides

- Hands-on classroom aids
- Activity ideas which include artistic, cultural and scientific approaches to fungi

- The basic information necessary to teach grades K–8 about fungi. Basic information is divided into grades K–3 and 4–8. It can be used for a 45–60 minute lesson or over an extended period of time. It can also be adapted for use in grades 9–12.

The Mushroom Trunk contains

- Lesson ideas and activities for grades K-12 relating to fungi
- Illustrations of fungi on 4"x5" poster board
- 9 overhead transparencies illustrating basic mushroom anatomy, the variety of shapes and spore-bearing surfaces of fungi, and fungi ecology
- 16 laminated spore prints
- 3 posters: Mycological Society of America "What You Can Do with Mycology"
- 2 NAMA posters on mushroom poisoning
- 26 slides of different fungi (35mm)
- 25 plastic hand lenses
- 13 dried fungi samples
- Foam blocks and skewers (to mount fresh specimens for drawing in the classroom)
- A copy of Emily Johnson's "North American Mushroom Photos Postcards"

The rental fee for this program is $40 for NAMA members and $50 for non-members. Return postage and $100 insurance will be paid by the renter. Send a request for renting the program for one week, together with a check or money order made out to NAMA, to

Carol Dreiling
61 Ardmion Park
Asheville, NC 28801-4201
caroldrei@aol.com
(828) 254-6199

The program was developed by Theresa Oursler, with the help and major contributions from Carol Dreiling, Louise Freedman, Samuel Ristich, Sandy Sheine, and Aileen Stanley. The program is the property of the author and of NAMA and is not to be copied or used for commercial purposes. *We encourage nonmembers to join NAMA in order to rent our programs at the member rates.*

Programs for Sale

Diagnosis and Treatment of Mushroom Poisoning. Kit Scates-Barnhart. Poster, 24 in. x 36 in. An excellent gift for clubs to give to hospitals and clinics. It is an important addition to any club's educational resources. Make check for $24.95 + $4.50 shipping and handling payable to Fungal Cave Books
1943 S.E. Locust Ave.
Portland OR 97214-4826

Pronouncing Names of Fungi. Cassette tape and script. Features the recorded voices of Dr. Alexander H. Smith and Dr. Rolf Singer. ***Side One*** contains Dr. Smith giving American pronunciations while ***Side Two*** has Dr. Singer with the European pronunciations. Helps you decide which pronunciations your friends will prefer! Make check for $7.75 payable to NAMA Education Committee and mail to NAMA Pronouncing Tape
1943 SE Locust Ave.
Portland OR 97214-4826

Slime Molds I, II, & III. These three historic films have been collected on one video, running about 65 minutes. The color films were prepared by James Koevenig in 1961 at the University of Iowa under the direction of C. J. Alexopoulos, G. W. Martin, and R. T. Porter. The video uses live-action and time-lapse photography, photomicrography, and animation to teach about the fascinating world of myxomycetes. Tapes will be prepared as individual orders are received, so allow extra time. Cost per tape is $29.95 + $5.00 shipping and handling ($7.00 s/h overseas).

The regular tape is in NTSC format (for North America) but is available in SECAM (France and others) or PAL (Spain, Germany, and others) by special order. Specify the required format and send check or money order for $46.95 (shipping included), payable to NAMA, to Dean Abel
Biological Sciences 138 BB
University of Iowa
Iowa City, IA 52242

Note: If you know of a slide, audio or video production that should become a part of this NAMA service, please contact Sandy Sheine, Education Committee Chair, P.O. Box 81640, Rochester, MI 48308, (248) 652-9498, <ssheine@aol.com>.

NAMA offers two new slide and tape programs on Eastern US/Canada

Do you live in the Eastern part of the United States or Canada, or are you planning to visit or relocate here? Would your club, school, or nature center in the East like an informative and entertaining program?

If your answer is yes to any or all of those questions, check out the two new slide and tape NAMA Education programs to rent. We have had many requests for programs covering the mushrooms in the Eastern part of the United States and Canada, so we are very pleased to offer them to you now.

NAMA Educational Programs continue on page 19

CALL FOR AWARD NOMINATIONS

Award for Contributions to Amateur Mycology

Nominations are now being accepted for the Award for Contributions to Amateur Mycology. This award, which consists of a plaque and lifetime membership in NAMA, will be presented at the 2006 foray. Nominations should be sent to Gary Lincoff, 157 W. 95th St., Apt. 1A, New York, NY 10025-6653 ***no later than April 1, 2006.***

Nominations for this award should include a description of the accomplishments the nominee has made in the field of amateur mycology. Extensively conducting workshops, leading forays, writing or lecturing about mushrooms and identifying mushrooms, *beyond the local club*, are examples of such accomplishments. Previous nominees who were not selected to receive the award are still eligible for re-nomination.

Please note that nominations for the Harry and Elsie Knighton Service Award are now being solicited from the presidents of NAMA's affiliated mushroom clubs. A person who has contributed mainly or exclusively in service to an affiliated club should be nominated for the Knighton Award rather than the Award for Contributions to Amateur Mycology, the latter intended to recognize a broader range of activity.

Past Recipients of this award:
1961—Guy Nearing
1962—John Stevenson
1963—Margaret McKinney
1964—John Cage
1965—Harry and Elsie Knighton
1966—Stanley Smith
1967—Dr. A. H. Smith
1968—Dr. Leo Tanghe
1969—Dr. Rene Pomerleau
1970—Dr. R. L. Shaffer
1971—Herbert Tweedie
1973—Dorothy Brown
1974—Dr. C. W. Ellett
1975—Dr. D. H. Mitchel
1976—Kit Scates—Barnhart
1977—Dr. Daniel Stuntz
1978—Dr. Sam Ristich
1979—Margaret Lewis
1980—Dr. Clark Rogerson
1981—Dr. Orson K. Miller, Jr.
1982—Ellen Trueblood
1983—Ingrid Bartelli
1984—Donald and Crystel Goetz
1985—Dr. Kent McKnight
1986—Gary Lincoff
1987—Dr. Harry Thiers
1988—Charles Barrows
1989—Walt Sturgeon
1990—Maggie Rogers
1991—Leeds and Marie Bailey
1992—Dr. Alan Bessette
1993—Dr. Moselio Schaechter
1994—Obe Schrader
1995—Edward Bosman
1996—Raymond Fatto
1997—Dr. Richard L. Homola
1998—Ms. Sondra Sheine
1999—Ms. Maria Maravigna
2000—Mr. William Roody
2001—Dr. Walter Sundberg
2002—Ben Woo
2003—not awarded
2004—Marti and Ken Cochran
2005—Dr. Tom Volk

The Harry and Elsie Knighton Service Award

The North American Mycological Association is soliciting nominees for the Harry and Elsie Knighton Service Award. This award was established by NAMA's Board of Trustees to recognize and encourage persons who have distinguished themselves in service to their local clubs. It is named for the Knightons because their efforts resulted in formation of the North American Mycological Association in 1967.

The annual award consists of a framed certificate; publicity for the winner and club in The Mycophile; a one-year membership in the organization; and registration, housing, and foray fees for the next annual NAMA Foray.

The annual award consists of a framed certificate; publicity for the winner and club in *The Mycophile*; a one year membership in the organization; and registration, housing and foray fees for the next annual NAMA Foray.

Each NAMA-affiliated mycological club may nominate one candidate who it feels has performed meritorious service during the current or preceding year. Normally, the President of the affiliated club makes the nomination unless, of course, the President is the nominee. Your nominee must be a member of your club but need not be a NAMA member.

We will acknowledge receipt of nominations, but the award will not be announced until this summer's annual NAMA foray in Wisconsin. Selection of the recipient will be made by the three most recent recipients of the award.

Letters of support, photographs, clippings from newsletters, etc., may accompany the descriptions of the member's contributions in service to the affiliated club.

To nominate, send **four** copies of the nomination and supporting material ***by April 1, 2006,*** to Gary Lincoff, Awards Chairman, NAMA, 157 W. 95th St., Apt 1A, New York, NY 10025-6653.

Past recipients of this award:
1989—Ms. Frances V. Davis
1990—Ms. Elsie Coulter
1991—Mr. Obe J. Schrader
1992—Mr. John R. Parkin
1993—Ms. Sylvia Stein
1994—Ms. Anna Gerenday
1995—Mr. Laurence M. Stickney
1996—Dr. William B. and Louise Freedman
1997—Ms. Athalie Barzee
1998—Mr. Lee K. Yamada
1999—Dr. Paul K. Harding
2000—Ms. Marilyn Shaw
2001—Vello Soots
2002—Ron Meyers
2003—John Plischke III
2004—None awarded
2005—Richard Bishop

NAMA Educational Materials,
continued from page 17

The two programs, "Mushrooms for Beginners" and "Edible Mushrooms," were developed by John Plischke III, a founder and member of the Western Pennsylvania Mushroom Club. John is an excellent photographer, a knowledgeable taxonomist, and a mushroom lecturer in great demand.

For "Mushrooms for Beginners," with 80 slides and accompanying commentary (printed and on tape), John has chosen fungi that grow on wood, in soil, on leaves, on dung, and in water. Also illustrated are edible and non-edible mushrooms, including poisonous ones, cultivated and wild fungi, as well as some suggestions for cooking and eating the edible ones. John includes mushrooms found in the East during all four seasons and also shows spore prints as tools for identification. Cultivation, photography, paper-making, and dyeing wool with mushrooms are shown as well.

The "Edible Mushrooms" program contains 140 slides and accompanying commentary (printed and on tape), covering 30 different gilled and non-gilled edible species. John illustrates many prepared dishes, along with the fresh mushrooms. Methods of drying, preserving, and cooking of mushrooms are discussed.

We have three sets of each program available for loan. Rental can be arranged through the NAMA website (www.namyco.org) or by writing to Carlene Skeffington, 41 Putnam Hill Road, Wilton, NH 03086.

—Sandy Sheine
Chair, NAMA Education Committee

2006 NAMA Photo Contest Entry Form

Name: _____

Address: _____

_____

_____

Phone: _____ E-mail: _____

_____

Classification: Limited [ ] Open [ ]

35mm slide contest: If there are not enough entries for two divisions, all entries will be judged in one division.

Digital: There will only be one division.

Entry Titles

Pictorial (Limited to 6 entries)

P–1: _____ P–4: _____

P–2: _____ P–5: _____

P–3: _____ P–6: _____

Documentary (Limited to 6 entries)

D–1: _____ D–4: _____

D–2: _____ D–5: _____

D–3: _____ D–6: _____

Judges' Option (Limited to 3 entries)

JO–1: _____

JO–2: _____

JO–3: _____

Mushrooms in a Series (limited to 3 entries)

S–1: _____

S–2: _____

S–3: _____

Entry fee enclosed: [ ] $4.00 for 35mm slide contest
[ ] $4.00 for digital contest

- *You must submit two entry forms if you enter both contests. Forms may be photocopied or downloaded from the Internet.*
- *Digital images may be e-mailed to namphocon@yahoo.com or mailed on a CD.*
- *For additional Digital Photo Contest Guidelines and FAQs see http://briefcase.yahoo.com/namphocon.*
- *Mail entry forms, entry fees, slides and/or CD, with check payable to NAMA, to*

John Plischke III—**Slides**
201 Culbertson Avenue
Greensburg, PA 15601
(724) 832-0271
fungi01@aol.com

Damian Pieper—**Digital**
35 Ventura Avenue
Iowa City, Iowa 52245
namphocon@yahoo.com

All entries must be received by June 15, 2006!

Annual Photo Contest Rules

Eligibility: The contest is open to all paid-up NAMA members. Non-members may enter if a separate check for 2006 dues ($35.00) is enclosed with the entry. Slides that have previously won (including Honorable Mention) are not eligible.

Closing Date: All ***entries*** must be received by the Contest Director(s) ***on or before June 15, 2006.*** Allow at least one week for mailing.

Subject material: For Pictorial and Documentary, organisms from the Myxomycota (slime molds) and the classes Basidiomycetes and Ascomycetes of the Eumycota ("true fungi") are eligible. For Judge's Option, nearly anything goes as long as 1) the theme relates to fungi and 2) fungi are a key element of the photograph.

Entry Divisions: For the 35mm slide contest, if there are not enough entries for two divisions, all entries will be judged in one division. There will be only one division in the digital contest.

Pictorial: This division is for single photos that illustrate the beauty and variety of fungi in form and color. The objective is a photo suitable for display or illustration in a fine book. Judging criteria include consideration of both technical (focus, depth of field, exposure, lighting, color, absence of distracting elements) and artistic (composition, color, background, lighting) aspects.

Documentary: For single photographs especially suited as illustrations in a field guide or monograph or for use in a lecture. Emphasis is placed on portrayal of key morphological characteristics such that the usefulness of the image as an identification aid is maximized. Subjects may be shot in the field, laboratory, or studio; and the photographer has complete freedom to process, manipulate, or orient the specimen in any desired manner to achieve the goal. Close-ups of single features and photomicrographs are acceptable. Judging criteria will be the same as in the Pictorial category, but they will be of secondary importance to the overall mycological utility of the photo. Accurate identification of the subject will be a consideration.

Judge's Option: For single photos or series that do not fit into Pictorial or Documentary divisions. Examples include time-lapse series, ecological relationships of fungi (e.g. fairy rings), fungi with animals, people enjoying fungi.

Mushrooms in a Series: For single photos or series which do not fit into the Pictorial or Documentary divisions. Examples include time-lapse series, etc.

Entrant Classifications: Limited or Open classification. *Open* is intended for experienced photographers who are not entering for the first time. *Limited* is intended for the novice. All entries from a person must be in either Limited or Open: no dual classification entrants. Entrants must compete in the Open class if they have won 1st, 2nd, 3rd, or Merit in two or more previous contests. The two classifications are judged separately for the Pictorial and Documentary divisions, and together for the Judge's Option.

Awards: First, 2nd, and 3rd prizes will be awarded in Pictorial and Documentary in both Limited and Open classifications. Additional Honorable Mention awards are given at the judges' discretion up to a maximum of 15% of the entries in that particular category. There will be no ranking in the Judges' Option division, and up to 20% of the entries may be selected. Prizes such as film, subscriptions, book credits, certificates, etc. are awarded, depending on the contest director's resourcefulness and the generosity of donors.

Format: Send color transparencies of any size that will fit into two-inch square plastic or cardboard mounts that function in a standard 80-slide carousel. Glass mounts will not be accepted. Slides may be cropped, retouched, or otherwise reprocessed.

Marking, Listing, and Submitting Slides: Mark each slide with a projection spot at the lower left corner of the mount when viewed right-side up out of the projector. The same side should include the entrant's initials, division initials, and slide number (e.g. OQ K-P-1). Use 1a, 1b, 1c, etc. for sequences. Fill out and submit the Entry Form along with your slides. Send by first class mail. Acknowledgment of receipt will be sent to you. If possible, arrange your packaging so that it can be reused in returning your slides.

Marking, Listing, and Submitting Digital Photos: What information do you want included in the digital photo's file name? If your computer program permits, we'd like to have at least these three things in your filenames: D (for Documentary), JO (for Judges Option), P (for Pictorial), or S (for Mushrooms in a Series); the photographer's initials in 3 spaces, followed by the Genus and species of the fungus or myxomycete if you can identify it; your title for the photo (unless it is the same as the previous) and, of course, the file extension. If you have enough space for your full name, the date the photo was taken, etc., or you wish to include other info, that is a bonus but not required.

Entry Fee: The entry fee for slides is $4.00. The entry fee for the digital contest is $4.00.

Reproduction: Entry in the contest constitutes the consent of the photographer to allow NAMA to reproduce two copies of each winning slide or digital photos (including Honorable Mention) for circulation by the Education Committee among the membership and affiliated societies. NAMA also reserves the right to post images of the winning slides and digital photos on the NAMA website, Namphocon, and in THE MYCOPHILE. All copyrights remain with the photographer.

Questions? Contact the Chair of the NAMA Photo Committee: John Plischke III, 201 Culbertson Ave, Greensburg, PA 15601, (724) 832-0271, e-mail: <fungi01@aol.com>. **See page 19 for Entry Form.**

Pathogenic Fungi: Structural Biology and Taxonomy. ISBN 0-9542464-7-0; 371 pp. ***Pathogenic Fungi: Host Interactions and Emerging Strategies for Control*** ISBN 0-9542464-8-9; 470 pp. Ed. by Gioconda San-Blas and Richard A. Calderone. Norfolk, U.K.: Caister Academic Press, 2004.

If Nik Money's *Mr. Bloomfield's Orchard* and *Carpet Monsters and Killer Spores* (reviewed in the May/June 2003 and Mar.April 2005 MYCOPHILE respectively) have you intrigued by the human disease potential of fungi, these two edited compilations of reviews will bring you up to date in many areas of medical mycology. However, be forewarned—these books are not for those with merely a casual interest in the subject. Prerequisites include a strong background in contemporary biology, not to mention a healthy bank account.

Usually we don't think much about fungi as causes of human disease. Humans are far more often targeted by bacteria and viruses; fungi tend to focus on plants. However, in recent years, invasive fungal infections have become a major cause of death in patients with aggressive blood disorders, organ transplant recipients, and others with compromised immune systems such as AIDS patients. Thus, it behooves us to at least be aware that our favorite Kingdom of organisms can turn on us (payback for rampant mycophagy?).

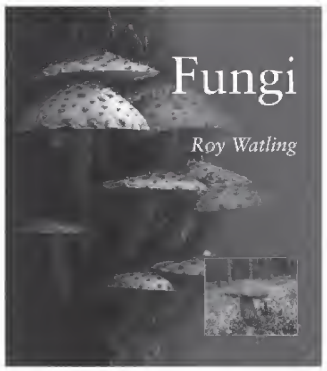
Together, the two volumes comprise 840 pages of text, reference citations, and index, plus an occasional figure and even a color plate or two. The contributors are 45 international researchers whose names are unlikely to be familiar to most NAMA members; only a few were to me.

The first volume (although actually they aren't numbered) is divided into two sections—"Fungal Dimorphism and Pathogenicity" and "New Taxonomic Tools." The first focuses on the structure and composition of the fungal cell wall and how it is made, the cell cycle of pathogenic fungi, what controls the form and growth of dimorphic fungi (those that can assume either of two forms—either hyphal or single-celled), and how mathematical modeling can help us to understand these processes. The second section presents new approaches to understanding how different strains of a fungal species vary, the potential significance of different strains for human disease, and how the use of molecular tools contributes to the classification of uncultured or otherwise hard-to-study fungi.

The second volume also is divided into two sections—"Fungal Interactions with the Host" and "Antifungal Antibiotics." A major emphasis of the first is on the two-way recognition systems that exist between them and us. Disrupting these systems, which also are important in formation of lichens, mycorrhizas and other fungal symbioses, is one avenue for prevention of fungal diseases. The section also describes the means by which the fungi avoid our defense mechanisms. The second section deals with the effort to find new drugs to combat these fungi—looking for aspects of their biology that can be targeted by drug action, how the fungi resist our drugs, and how modeling can be used in this search.

These books clearly are not for everyone. However, if you need, or want, to get up to date on the darker side of human-fungal interactions, this would be a good place to start.

[*Available from Caister Academic Press, 32 Hewitts Lane, Wymondham, Norfolk NR18 0JA, UK, website www.caister.com. Each volume $199.00 (cloth).*]



Fungi, by Roy Watling. Washington, D.C.: Natural World Series; Smithsonian Books (in association with the Natural History Museum, London), 2003. ISBN 18834-082-1

Some time ago, I favorably reviewed another book in the Smithsonian Natural World series—*Lichens*, by William Purvis (THE MYCOPHILE July/Aug. 2001)—and this addition to the series by Roy Watling is another gem: informative but concise, accessible, and beautifully illustrated.

For those who aren't acquainted with Roy Watling, he is more or less the British analog of Orson Miller or the late Harry Thiers—a prolific professional mycologist who always seems to find time to interact with amateurs and the lay public and inspire them to learn more about fungi. Roy's ability to impart knowledge in a way that is easily understood is evident in this general introduction to many aspects of mycology, centered on the mushroom fungi.

The book consists of seven chapters—How Important Are Fungi?, What Is a Fungus?, The Larger Fungi, When and Where?, Collecting and Studying Fungi, Fungi and Humans, and Conservation—followed by a glossary, index, and lists of information sources, both electronic and printed. The

Continued on page 22

Reviews, continuted from page 21

chapter titles accurately convey the contents. Much of the information has a strong ecological flavor to it, reflecting Roy's interest in understanding what the fungi are doing in the places where they live. This, and his British perspective—on conservation, for instance—lend a refreshingly different tone to the book for those of us in North America. The photographs and other illustrations supporting the text are all first-rate; I am particularly fond of the shot of an earthstar in action.

No sense going on and on. This is simply a great little book—for your library or coffee table, or perhaps as a gift for friends or youngsters to start them learning about our most interesting group of organisms.

[*Available from Smithsonian Institution Press, Suite 4300, 750 Ninth Street NW, Washington, DC 20560-0950. Website: www.sipress.si.edu . Tel. (800) 233-4830. $16.95 (paper)*]

Both book reviews are by Steve Trudell, Seattle, Washington.

DVD REVIEW

The Mushroom Identification Trilogy DVD Video, by Taylor Lockwood. (58 min.), $24.95

For a long time I've been wishing that someone would make a professional video about fungi, one that would be both educational and entertaining. Finally in early 2005, Taylor announced that he was embarking on a new mushroom project, a teaching video. He spent months working on it, doing research, consulting with experts in both mycology and teaching, and writing the script. He then combined his photographs and his video recordings to produce this wonderful DVD.

The program clearly shows every aspect of the basics of mushroom identification. It is divided into three parts:

"Part I: Introduction, a quick overview," illustrates the morphology of the higher fungi. It depicts the sizes, shapes, colors, and parts of different kinds of mushrooms and the endless variety of ways that they grow and disperse their spores. Poisonous, non-poisonous, and edible mushrooms are briefly discussed in Part I and in more detail in Parts II and III. Habitat and the important relationship of fungi to the environment are also illustrated.

"Part II: Into the details" gives taxonomic terms including the classification system and the scientific naming system. Mycology, like many other fields of science, is changing in how it views criteria by which it uses to name species. The Latin names used in the Trilogy are a mix of older names that many people are used to, generally accepted current names, and sometimes both. Also, although Latin names are generally italicized, they are not in the video because of readability on television screens. Important field characteristics are explained as well as methods for describing a mushroom. General descriptions of basidiomycetes with gills, pores, teeth, and gastroid forms are shown. Some common ascomycetes are described as well.

"Part III: Into the woods" takes the viewer on a talking tour of mushrooms commonly found in North America. Using the terminology covered in Part II, you are shown an overview of what you might find. Many genera and their included species are clearly described. The genus *Amanita* is well covered, along with a warning about poisonous mushrooms. Such topics as parts of fungi, color changes, odor, grouping and relationships to plants are covered. This section contains so much information that it should be viewed several times.

This DVD is an illuminating companion to regional field guides. Of course, it can also be enjoyed simply for its visual appeal, like all of Taylor's beautiful photography. The primary purpose of the North American Mycological Association is education about fungi, so this DVD is a most welcome addition to our educational resources.

Message from Ike, continued from page 2

goes beyond my ability to change.

I hope I've not offended anyone here as some of the individuals who sent in these questions are now NAMA members and may be reading this. As I should, I always refer them to the NAMA website and beg them to join. My point is this: isn't it wonderful that there exists an organization where those with absolutely no knowledge of fungi can ask their questions? How many other scientific organizations can you name where questions ranging from those above to the most technical aspects of the science are not only handled but are welcomed and encouraged?

Happy hunting. See you in the morel patches. —Ike

Pickles, continued from page 7

tation also produce better flavors and release nutritious vitamins in mushrooms? I don't know.

If you decide to try mushroom pickles, make certain that every jar seals properly. Prior to use, always inspect jars to make sure the lid is still sealed (button down), and check for mold growth (visible growth on the surface of the canned product) or yeast growth (cloudy liquid) and off odors. Discard suspect containers without tasting!

For longterm storage of surplus mushrooms consider drying the excess or cooking and then freezing them. Freezing uncooked mushrooms is dangerous since the enzymes are still active in uncooked mushrooms and spoilage can occur. Try making duxelles and then freeze them in ice cube trays. Once they are frozen, transfer them to a closed container in your freezer, taking out as many cubes as needed to heat quickly for a snack on crackers or to add to an omelet, soup, stew, etc. Since learning about duxelles at an OMS foray in May 2005, I have made duxelles out of morels, boletes, and chanterelles. All were delicious!

Chaga, continued from page 8

"Irina invites you to a cup of chaga tea."

Russian entrepreneurs are now searching Siberian forests and collecting enormous quantities of chaga for the expanding chaga trade. There is a company on the Kamchatka peninsula that is capable of exporting 10,000 kilograms of chaga annually.

But wait! We have not come to the end of the chaga story. Another common name for *Inonotus obliquus,* in some circles, is "the true tinder fungus." While researching chaga on the Internet, I found that chaga is well known in the "primitive skills community." These are folks who enjoy the challenge of starting fires without matches, using methods employed by humans millennia before modern times. One method is the striking together of pieces of iron pyrite to generate a spark, which then falls upon on and ignites the chaga tinder. Masters of this method swear by chaga and have found it to be the best of all tinders. The dried inner portion of the chaga is the part used. It is also sold for use in "fire pistons." Another polypore, *Fomes fomentarius,* has a very similar common name, "true tinder polypore" (the common name you will find in most field guides). This was the species I was familiar with for use as tinder. *Fomes fomentarius,* however, is a much harder fungus than *I. obliquus* and requires more preparation before use. Chaga is superior because it requires no preparation and it "takes a spark" better. Primitive skills folks have found a method that further enhances the virtues of chaga as a tinder: "repeated applications of urine (letting it dry in between) makes it much better at taking a spark" (see www.icomm.ca/survival/tinder1.txt, www.survivalschool.com/products/fire_starting/, or www.jackmtn.com/masswildlife.html.)

A final note: Let's return to *The Cancer Ward.* One of the characters learns that there are black market "suppliers" of chaga, who command mucho rubles for their product. After the requisite condemnation of this capitalistic enterprise, he objects to the high price. Kostoglotov replies, *"Do you think you can just go into the woods and get it? You have to walk about in the forest with a sack and an ax. And in the winter you need skis . . .* (48).

In early March of this year a group from the Minnesota Mycological Society headed up to the northern part of our state with sacks, hatchets, and cross-country skis. With a good snow cover and leafless trees we could cover lots of ground and scan many birch trees, looking for big black bumps on a white background. After surveying more than 15,000 trees, the Great Chaga Expedition returned with a haul of about 25 pounds of precious fungus. I have been drinking chaga tea daily ever since.

[*Editor's note: The author is the President of the Minnesota Mycological Society and Chairman of NAMA's Cultivation Committee.*]

◆

Further Reading

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Newsletter of the North American Mycological Association
THE MYCOPHILE

Mushroom of the Month

This photo of Calostoma cinnabarina *by David Work won Honorable Mention in the 2005 Annual Slide Contest.*

Chaga, continued from page 1

literature, there was no cancer among the peasants who came to him . . . so he began to investigate and he discovered a strange thing: that the peasants in his district saved money on their tea, and instead of tea brewed up a thing called "chaga", or in other words, birch fungus. Actually it's not even a mushroom but . . . a peculiar growth on old birch trees . . . like spines, black on top and dark brown inside. . . . Anyway Sergei Nikitich Maslennikov had an idea. Mightn't it be that same 'chaga' that had cured the Russian peasants of cancer for centuries without their even knowing it? (144)

Solzhenitsyn's novel is largely autobiographical. After years in a Stalinist labor camp, he was finally released but remained in exile. Shortly thereafter, he too developed a malignant tumor and was a patient on a cancer ward in a clinic in Tashkent, Uzbekistan. Did he use chaga to treat his cancer? It certainly seems likely. Did it cure him? Who knows—he got plenty of radiation, too. In any case, he regarded his recovery as miraculous, and it was a turning point in his life.

Chaga, in fact, has been used in Russian folk medicine since at least the 16th century. It was used to treat "consumption" and cancers, often stomach and lung cancers, and it was likewise considered useful for other common stomach and intestinal ailments such as gastritis, ulcers, colitis, as well as general pain—thus a panacea, held in high esteem in much the same way as the Reishi and Lingzhi (*Ganoderma lucidum*) in the Orient. Since 1955, a refined extract of the chaga fungus ("Bifungen") has been manufactured and sold in Russia for the treatment of stomach and intestinal diseases.

I recently learned that chaga continues to be used in Russia. The Minnesota Mycological Society had a fungus exhibit at the Science Museum of Minnesota. There was a big chunk of chaga on the table. One of the visitors was a Russian physician. She immediately recognized it and enthusiastically told us about how it is used in her country. The chaga is used as a very concentrated alcohol tincture. The prescription: give three times daily one drop of tincture for each year of the patient's age. That would be 62 drops for me!

There is now scientific research to support the claims of the folk medicinal uses. The most frequently cited analytic studies on chaga are those by Kirsti Kahlos, a pharmacognycist at the School of Pharmacy, University of Helsinki, Finland. Kahlos and her colleagues found a wide variety of active triterpenes, which have antitumor properties. Of those, the most active was specified as inotodiol. They also found the compound "betulin"—actually a compound from the birch tree that has anticancer properties. The chaga fungus absorbs and concentrates the betulin (betulinic acid) from the birch and transforms it into a form that can be ingested. Other researchers have found active polysaccharides, a common occurrence in most medicinal mushrooms such as Maitake and Shiitake. Those polysaccharides are known to stimulate the immune system. Kahlos and other researchers, in addition, have found significant anti-cancer activity against specific tumor systems and preliminary evidence of antiviral activity against HIV and influenza viruses. An extensive listing of scientific studies on chaga may be found in the books by Hobs and Stamets. (These and other references are cited at the end of this article.)

I am sure most MYCOPHILE readers already know the mycological identity of chaga: it is the polypore *Innonotus obliquus,* a northern species that grows on birch, alder, and beech trees. However, only the fruiting bodies growing on birch are considered suitable for medicinal purposes. In its usual form, it is hardly recognizable as a mushroom. One of its common names, the "clinker polypore," is good a descriptor. It looks liked a tumor, with a charred gnarled surface wedged in the trunks of birches. Even though it is a polypore, you will not see any pores as on the underside of shelf-like polypores. It is considered a "sterile conk." The black outer surface is hard, cracked, and quite irregular. When you (carefully) chop it off the tree trunk with your hatchet, you will find a yellow-brown interior that has a cork-like consistency and is marbled with cream-colored veins. If you are lucky, you can find your chaga growing within reaching distance on the birch trunks; however, the conks often grow at a height of 10 to 30 feet, which poses quite a challenge for collecting. I've heard a rumor that Lee Moellerman, the MMS foray leader, uses a shotgun to blast them loose. I am sure our Russian contemporaries now go out with chain saws. Some of those high altitude prizes may weigh over 10 pounds. The ideal chaga fruiting body is 25 years old. Now consider this: according to one chaga product site, only one birch tree in 15,000 bears chaga!

The hard-core mycological types among you may be interested to know that *Inonotus obliquus* is a white rot fungus in the family *hymenochaetaceae*. It is monomitic, having only generative hyphae and no clamp connections. If you want to know what all that means, there is no better resource than Tom Volk's Polypore Primer, which you can visit at botit.botany.wisc.edu/toms_fungi/polypore.html.

With the phenomenal popularity of herbal medicine in recent years, there is a growing market for chaga in this country, and a number of chaga preparations may be found for sale on the Internet and in health-food venues. There is even greater demand in Asian countries. Do a Google search on chaga and you will find many sites have unfamiliar characters requiring translation. Here is a claim from Eastern Synergy, a chaga marketer from Singapore: "*20–25 times more potent than mushroom like Agaricus, Ganoderma Lucidum.*

1gm Chaga mushroom = 40 lbs carrots
= 4 gal beet juice
= 4ml clove oil

** Free radical is the cause of cancerous cell (ORACtest: Tufts University)*"

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